

TITLE VI  
ADMINISTRATIVE  
COMPLAINT

re: Louisiana Department of  
Environmental Quality/  
Permit for Proposed Shintech Facility

DRAFT REVISED  
DEMOGRAPHIC INFORMATION

U.S. Environmental Protection Agency  
Office of Civil Rights  
401 M Street, S.W.  
Washington, D.C. 20460

April 1998

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Re: April 1998 Draft Revised Demographic Information for  
Title VI Administrative Complaint File No. 4R-97-R6

Dear Mr. Givens, Mr. Kuehn, and Mr. Mason:

On July 16, 1997, the Tulane Environmental Law Clinic, on behalf of St. James Citizens for Jobs and the Environment and other organizations (Complainants) filed an administrative complaint with EPA's Office of Civil Rights (OCR) under Title VI of the Civil Rights Act of 1964, as amended (Title VI). The complaint alleged violations of Title VI and EPA's Title VI regulations (40 C.F.R. Part 7) by the Louisiana Department of Environmental Quality (LDEQ) arising from the permitting of the proposed Shintech facility in St. James Parish, Louisiana. OCR accepted the complaint for investigation on August 8, 1997.

As you are aware, Title VI prohibits discrimination based on race, color, or national origin under programs or activities of recipients of federal financial assistance. EPA has adopted implementing regulations that prohibit unjustified discriminatory *effects* which occur under federally-assisted programs or activities. Discrimination can result from policies and practices that are neutral on their face, but have the *effect* of discriminating. Facially neutral policies or practices that result in discriminatory effects violate EPA's Title VI regulations unless they are justified and there are no less discriminatory alternatives.

On January 30, 1998, OCR issued the document entitled "Draft Demographic Information," which represented EPA's initial analysis of the Complainants' allegation that LDEQ's permitting of "toxic" facilities disproportionately affects African Americans in violation of EPA's Title VI regulations. OCR had not drawn any conclusions based on the analysis done at that time. The January "Draft Demographic Information" was provided to the Complainants, LDEQ, and Shintech and was posted on EPA's worldwide web site for public access.

In mid-February, EPA met with each of you and your representatives in Louisiana to discuss the January "Draft Demographic Information." EPA also provided each of you an opportunity to provide written comments. We have reviewed the comments submitted by LDEQ and the three sets of written comments submitted by the Tulane Environmental Law Center, as well as the oral comments we received during our meetings. OCR is preparing a response document that will be sent under separate cover.

Due to refinements in EPA's thinking and as a result of some of the comments we received, we have made several changes and adjustments to the analysis, including some that we mentioned to you in February. A brief description of the revisions is provided below.

EPA has conformed its Industrial Corridor Parishes to the twelve parishes LDEQ uses to define the Mississippi River Industrial Corridor. Likewise, the Industrial Corridor 3-Mile Zone from EPA's January "Draft Demographic Information" was extended through these same parishes. EPA has also examined several new facility universes, namely TRI facilities with the same Standard Industrial Classification (SIC) codes as the proposed Shintech facility and Toxic Emissions Data Inventory (TEDI) facilities reporting air emissions greater than 20,000 pounds and 100,000 pounds.

With assistance from LDEQ, Region 6 was able to obtain better point locations for many of the TEDI facilities, and to complete some demographic analyses for several facility universes using a 1, 2, and 4 mile buffer from the boundaries of facilities (i.e., polygons). The revised data were used to update demographic analyses generated for 1995 TRI and 1996 TEDI point locations. To examine the demographic characteristics for St. James Parish in more detail, EPA used polygons for existing facilities and the point locations for two recently permitted iron reduction facilities and the proposed Shintech facility. The results of these polygon and "St. James 1997" point location analyses are displayed in the updated tables. OCR has also retained, in Appendices 1 and 2, the results of some cumulative total population analyses from the January "Draft Demographic Information," which include the proposed Shintech facility.

In the January "Draft Demographic Information," EPA included analyses on the racial composition of populations living in proximity to facilities. These analyses compared African Americans to non-African Americans. In the attached "Draft Revised Demographic Information," EPA has conducted additional analyses comparing the number of African Americans that are "expected" to live in the proximate area (based on their proportion of the reference population) to the number of African Americans that EPA estimates to live in the proximate area. These

comparisons indicate whether the number of African-Americans in the proximate area is higher than their expected value.

In the attached "Draft Revised Demographic Information," EPA has also included a new section describing the types of information, beyond the demographic analyses, that may be considered in the Agency's adverse disparate impact determination. We have included this information to provide you an opportunity to review and comment on our proposed approach for defining adverse disparate impacts in this case.

As was stated previously, given the impracticability of conducting risk assessments for the selected universes of facilities, EPA continues its efforts to develop tools to evaluate facility impacts for the purposes of Title VI. For this investigation, the Agency will continue to use proximity to facilities as an important point of departure in understanding facility impacts and the relative impacts from TRI emissions on African Americans and non-African Americans. OCR has also begun to examine a new universe of Program 3 facilities under LDEQ's Chemical Accident Prevention Regulations. These regulations were designed to prevent accidental releases of chemicals to the air and to minimize consequences of such releases. Although the analyses for this facility universe is not yet complete, OCR will consider the results before concluding its investigation.

An updated description of the methodology and tests used for the revised analyses is provided in the enclosed document and OCR seeks your comments on the enclosed materials. OCR has not drawn any conclusions based on its Title VI investigation. Your comments will be taken into consideration as we conclude the investigation and prepare our initial findings. We will contact you shortly to schedule meetings later in April to discuss the "Revised Draft Demographic Data," methodology, and next steps.

Please submit written comments regarding the analyses to me by May 4, 1998, at the U.S. EPA Office of Civil Rights, 401 M. Street, SW, Washington, DC 20460.

Sincerely,

Ann E. Goode  
Director

Enclosures

**Title VI Administrative Complaint**

**Re: Louisiana Department of Environmental Quality**

**Permit for Proposed Shintech Facility**

**Summary Documentation**

**of**

**Draft Revised Demographic Analysis**

**Through April 7, 1998**

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## I. Adverse Disparate Impact Considerations

Under the various environmental laws, EPA has an obligation to protect the public and the environment from the potentially harmful effects of pollution sources. EPA has promulgated a wide series of federal regulations to accomplish these goals. However, the fact that a source of pollution is regulated and emissions may be reduced to levels designed to protect public health and the environment, does not mean that a regulated source produces no effects. For example, permitted facilities may bring the risk of accidental releases, whether from spills of products or wastes, or from fires or explosions. They may also bring a variety of other impacts which may not fall under a federal law's definition of human health or environmental impacts, but are nonetheless evaluated by the permitting agency (*e.g.*, noise, odors) during a permitting process. Moreover, regulated pollution sources ordinarily have spills, venting, bypassing<sup>1</sup> of the pollution control devices, upset,<sup>2</sup> startup, shutdown, and malfunction<sup>3</sup> events which are often contemplated and allowed as an unavoidable part of running any industrial process<sup>4</sup>, as well as ongoing permitted releases.

The environmental laws generally treat many of these effects as "acceptable" when pollution sources are regulated under individual, facility-specific permits, recognizing society's demand for such things as power plants, waste treatment systems, and manufacturing facilities. In effect, Congress--and, by extension, society--has made a judgment that some level of pollution and possible associated risk should be tolerated for the good of all, in order for Americans to enjoy the benefits of a modern society--to have electricity, heat in our homes, and the products we use to clean our dishes or manufacture our wares. Similarly, society recognizes that we need facilities to treat and dispose of wastes from our homes and businesses (such as landfills to dispose of our trash and treatment works to treat our sewage), despite the fact that these operations also result in some pollution releases. The expectation and belief of the regulators is that, assuming that facilities comply with their permit limits and terms, the allowed pollution levels are acceptable and low enough to be protective of most Americans.

Importantly, this presumption of the acceptability of residual pollution contemplated by permits did not consider that it would be distributed in such a way that it becomes concentrated in racial

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<sup>1</sup> "Bypasses" under the Clean Water Act are defined at 40 C.F.R. § 122.41(m) (1997).

<sup>2</sup> "Upsets" under the Clean Water Act are defined at 40 C.F.R. § 122.41(n) (1997).

<sup>3</sup> "Startup, shutdown, and malfunction" for purposes of certain programs under the Clean Air Act are defined at 40 C.F.R. § 60.27 and 63.2 (1997). "Approved trial burns" under the Resource Conservation Recovery Act are defined at 40 C.F.R. § 264.344(a)(1)(1997).

<sup>4</sup> See 40 C.F.R. § 60.8(c) and 63.7(e) (1997).



or ethnic communities. Title VI and EPA's implementing regulations<sup>5</sup> speak to that issue, by setting out an independent requirement that all recipients of EPA financial assistance ensure that they implement their environmental programs in a manner that does not have a discriminatory effect based on race, color, or national origin. If recipients of EPA funding are found to have implemented their EPA-delegated or authorized federal environmental programs (*e.g.*, permitting programs) in a manner which distributes the otherwise acceptable residual pollution or other effects in ways that result in a significant concentration of those effects in racial or ethnic communities,<sup>6</sup> then a finding of an adverse disparate impact on those communities within the meaning of Title VI may, depending on the circumstances, be appropriate.<sup>7</sup>

EPA believes that the determination of whether the distribution of effects from regulated sources to racial or ethnic communities has resulted in an adverse impact actionable under Title VI will necessarily turn on the facts and circumstances of each case. As the United States Supreme Court stated in the case of Alexander v. Choate,<sup>8</sup> the inquiry for federal agencies under Title VI is to identify the sort of disparate impacts upon racial or ethnic groups which constitute "sufficiently significant social problems, and [are] readily enough remediable, to warrant altering the practices of the federal grantees that had produced those impacts."<sup>9</sup>

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<sup>5</sup> Title VI of the Civil Rights Act of 1964, as amended, provides that "no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal assistance." 42 U.S.C. section 2000d et seq. EPA's Title VI implementing regulations provide that recipients of EPA financial assistance "shall not use criteria or methods of administering its program which have the effect of subjecting individuals to discrimination" because of their race, color, or national origin. 40 C.F.R. § 7.35(b)

<sup>6</sup> For example, scenarios involving the combined impacts of multiple pollutants, multiple pathways, and multiple plants.

<sup>7</sup> The purpose of EPA's Title VI policy is anti-discriminatory, not to seek an equal distribution of "allowed" or "acceptable" pollution to all members of society. By their structure, EPA's Title VI regulations reflect the understanding that the reasons for disparate distribution of benefits and burdens can be diverse and complex, and that not every situation presenting a disparity necessarily rises to the level of actionable discrimination. Accordingly, EPA's Title VI discriminatory effect regulations are concerned with *unjustified* adverse disparate impacts. *E.g.*, *Coalition of Concerned Citizens v. Damian*, 608 F. Supp. 110 (S. D. Oh. 1984).

<sup>8</sup> 469 U.S. 287 (1985).

<sup>9</sup> Id., at 293-94 (1985) (emphasis added).

In the context of the complaint investigation regarding the permitting of the proposed Shintech facility, and in its assessment of whether there is an adverse disparate impact, EPA will review and take into consideration information including:

- the demographic characteristics of proximate populations (*i.e.*, the populations living in proximity to or within exposure pathways of facilities of concern);
- the characteristics of facility activities (*e.g.*, amounts and relative toxicity of emissions; potential for releases resulting from spills or accidents);
- the presence of additive or cumulative pollution loadings; and
- increased potential for accidental releases associated with a concentration of industrial activity.

EPA is currently reviewing materials submitted by the Complainants, LDEQ, and Shintech, including risk assessments, summaries of health statistics, emissions data, information from the Emergency Response Notification System (ERNS) database, and information concerning consequences and prevalence of accidental releases to determine the evidential merit of the information. In addition, EPA has used several approaches to compare potential adverse disparate impacts in African American and non-African American populations. These approaches include comparing aggregates of TRI air emissions by county, grouping facilities by the volume of air releases for demographic analyses, accounting for variable chemical toxicities by “normalizing” potential chemical impacts over proximate areas, and (in the near future) exploring approaches to reflect local dispersion characteristics. In reaching an initial determination regarding whether or not a adverse disparate impact exists, EPA will examine the totality of the evidence compiled during the course of the investigation.

## **II. Summary Documentation of Draft Demographic Analysis Through April 7, 1998**

EPA developed data regarding the racial demographics of populations in proximity to and the relative toxicity of emissions of various facilities to assist in the Title VI complaint investigation of the allegation that African American residents in Louisiana are being subjected to unjustified adverse disparate impacts from industrial facilities permitted under the Louisiana Department of Environmental Quality’s (LDEQ) environmental regulations. Most of the population data compilation and verification of location data was performed by EPA’s Region 6 Office in Dallas, Texas and by the Office of Information Resources Management in Washington, DC. Statistical analyses were performed by statisticians in the Office of Policy, Planning and Evaluation. The burden analysis was conducted by the Office of Research and Development using the relative toxicity weighting from the Office of Pollution Prevention and Toxics’ Risk Screening Environmental Indicators. The information provided below summarizes the databases, methodologies, and tests used to generate the information provided in the attached documents.

### **III. Description of Databases Used**

The data used for the analyses included the 1990 Census at the block level (U.S. Census Bureau 1990), 1995 Toxics Release Inventory (TRI) (U.S. EPA 1997), 1996 Louisiana Toxic Emissions Data Inventory (TEDI) (Louisiana Department of Environmental Quality 1998) and LDEQ's Chemical Accident Prevention Program (Louisiana Department of Environmental Quality 1998).

#### **A. 1995 Toxics Release Inventory (TRI )**

The facilities reporting to TRI to date are those facilities which are in Standard Industrial Classification (SIC) codes 20-39 and employ at least 10 people. They must report annual releases and transfers of chemicals which are on the TRI list and which are manufactured, processed or otherwise used above threshold amounts. TRI reports include separate information on releases to each environmental medium (*e.g.*, air, water, land) and offsite transfers for treatment or disposal, as well as chemicals recycled, used in energy recovery, and present in waste streams. The list of chemicals subject to reporting in 1995 (the most recent year for which data are available) included approximately 650 chemicals and chemical classes. The TRI database contains a wide range of manufacturing facility types, including chemical, rubber, plastics, and petroleum refineries, food processing (*e.g.*, sugar refineries), electronics manufacturing, and other miscellaneous facilities, such as soft drink bottling facilities. Reporting was recently expanded to a large set of new industry sectors, with the first data due in 1998.

#### **B. 1996 Toxic Emissions Data Inventory (TEDI)**

Promulgated in 1991, TEDI<sup>10</sup> is an annual reporting requirement, similar to the TRI, for toxic air pollutants. Despite its similarities to the TRI, TEDI includes several pollutants (including hydrogen sulfide) which are not covered under TRI's reporting requirements. TEDI expands the range of facilities required to report toxic emissions. As a result, TEDI should be considered a separate Louisiana specific requirement; it is in addition to federal TRI reporting requirements.

TEDI covers approximately 100 air pollutants and classifies them by toxicity. Specifically, TEDI recognizes three classes of pollutants: Class I includes all "known and probable human carcinogens," Class II is comprised of "suspected human carcinogens and human reproductive toxins," and Class III lists "acute and chronic toxins."

Under TEDI, facilities, including those classified as "majors,"<sup>11</sup> must provide an annual report, by July 1, on each listed toxic air pollutant. TEDI reports have been received for calendar years 1991 through 1996.

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<sup>10</sup> Chapter 51 of the Louisiana Administrative Code (LAC 33.III.51).

<sup>11</sup> A "major source" is a one with the potential to emit 10 or more tons per year of one pollutant or 25 or more tons per year of a combination of pollutants.

### **C. Facilities Reporting under LDEQ's Chemical Accident Prevention Program**

On November 20, 1996, LDEQ adopted the Chemical Accident Prevention Regulations (LAC 33:III.Chapter 59) designed to prevent accidental releases of chemicals to the air and to minimize consequences of such releases. The resulting regulations are very similar to EPA's Risk Management Program (RMP) rule promulgated under § 112(r) of the Clean Air Act. LDEQ focuses on chemicals that pose a significant hazard to the community with the goals of preventing accidental releases and minimizing offsite consequences of such releases. Currently, there are over 140 regulated substances in LDEQ's Chemical Accident Prevention Program..

LDEQ's regulations require all stationary sources with any of the listed regulated substance(s) above the threshold quantity to register by January 31, 1998 and submit an RMP by June 21, 1999. The complexity of the RMP depends on the type of facility, its history, and its potential for an environmental or a health impact.

### **D. 1990 Census of Population**

Most of the 1990 Census data are compiled into geographic areas ranging from national to regional or state down to "block groups" and "blocks" of a hundred people or less. The population figures released first are block-level data used in performing Congressional redistricting pursuant to Public Law 94-171. (U.S. Census Bureau 1991). EPA combined these figures with block boundaries in developing a set of block-level geographic files, or "coverages," for its use with Geographic Information Systems (GIS).

The block boundary data were derived from a set of line data which contain most of the streets and other linear features (*e.g.*, railroads, coastlines) at the time the Census was conducted. This file, known as the Topologically Integrated Geographic Encoding and Referencing (TIGER) file (U.S. Census Bureau 1992), has been partially updated since the 1990 Census to include additional information concerning the range of addresses present along specific street segments. This address range information allows a GIS to estimate location coordinates for an address value using a process known as "address matching."

## **IV. Facility Universes**

The analyses examine the racial composition of populations living near the proposed Shintech facility, as well as those living near other facilities which are potential sources of similar impacts. Shintech has proposed to build a new major chemical production complex in St. James Parish, Louisiana which would have three production plants for vinyl chloride monomer (VCM), polyvinyl chloride (PVC), and a chlor-alkali plant. (See Figure 1). If built, Shintech will be subject to TRI, TEDI, and will likely report to LDEQ's Chemical Accident Prevention Program reporting requirements. Also, Shintech has indicated its business activities are classified under

SIC codes 2812<sup>12</sup>, 2821<sup>13</sup>, and/or 2869<sup>14</sup> which are all a portion of the major grouping chemical manufacturers (SIC 28).

## A. TRI

EPA decided to examine the racial composition of the populations residing near Louisiana's TRI facilities for several reasons. The complaint contains allegations regarding LDEQ's permitting of facilities that generate, treat, store, and dispose of toxic chemicals. TRI is a widely used and publicly available database containing reports from facilities on specific toxic chemicals with reporting triggered by the volume of chemical used and releases to each environmental medium. TRI also includes reported and reviewed facility locational information.

Due to the broad range of TRI reporters, EPA wanted to examine some focused subsets of TRI facilities in addition to looking at all TRI facilities. EPA has selected several groupings of TRI facilities that are similar in certain ways to the proposed Shintech facility. For example, data was generated estimating the populations within the three distances from TRI facilities reporting any of those three SIC codes reported by Shintech.

Releases to air appear to be the primary concern in the Title VI complaint. Shintech estimates it will report about 192,000 pounds of air releases annually to TRI. (Shintech 1997; Shintech 1998, U.S. EPA 1998). The requirement to report to TRI does not depend on the magnitude of releases or even that a facility releases to all environmental media (*e.g.*, land, water, air); therefore, facilities may report zero air emissions. Rather, the requirement depends upon the amount manufactured, processed, or otherwise used. As a result, EPA examined a subset of TRI facilities that only included those reporting total air releases (combined fugitive and stack) above zero. Similarly, EPA looked at TRI facilities with various magnitudes of TRI releases to air.

The TRI facility universes examined include:

- ! all TRI facilities (See Figure 2);
- ! TRI facilities reporting SIC codes 2812, 2821, and/or 2869 (TRI SIC);
- ! TRI SIC facilities reporting greater than 20,000 pounds of total air releases;
- ! TRI SIC facilities reporting greater than 100,000 pounds of total air releases;
- ! TRI facilities reporting greater than 0 pounds of total air releases;
- ! TRI facilities reporting greater than 20,000 pounds of total air releases; and
- ! TRI facilities reporting greater than 100,000 pounds of total air releases.

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<sup>12</sup> Plastics and synthetic resins, including vinyl resins (but not fabricated plastics products made from resins).

<sup>13</sup> Industrial inorganic chemicals, including chlorine and caustic soda.

<sup>14</sup> Industrial organic chemicals, "not elsewhere classified."

Earlier in the process, EPA was also examining TRI facilities reporting greater than 10,000 pounds of total air releases. However, EPA did not continue to pursue the compilation of data for this subset of TRI facilities because there was not an appreciable difference with the facility universe of TRI facilities reporting greater than 20,000 pounds of air releases. (See Attachment 1).

## **B. TEDI**

TRI is not the only list of facilities that have toxic air releases. As discussed above, TEDI contains a list of facilities that emit toxic air pollutants defined by Louisiana law. LDEQ's Record of Decision for the Shintech Title V permit under the Clean Air Act (CAA) states that the proposed facility will emit eight pollutants regulated by LDEQ as toxic air pollutants (TAPs), five of which are also volatile organic compounds (VOCs) regulated under the CAA.<sup>15</sup> Shintech will therefore be required to report to TEDI. The proposed facility is also expected to emit five criteria pollutants<sup>16</sup> regulated under the CAA. While there is some overlap between facilities reporting to TRI and those reporting to TEDI, they are not identical databases; therefore EPA decided to examine the racial composition of populations near TEDI facilities.

The TEDI facility universes examined include:

- ! all TEDI facilities (See Figure 3);
- ! TEDI facilities reporting greater than 20,000 pounds of total air releases; and
- ! TEDI facilities reporting greater than 100,000 pounds of total air releases.

## **C. Facilities Reporting under LDEQ's Chemical Accident Prevention Program**

On November 20, 1997, LDEQ amended its Chemical Accident Prevention regulations to require the up-front registration requirements for all stationary sources that are subject to the Chemical Accident Prevention Program. All facilities subject to the rule and those facilities previously registered, were required to register or re-register by January 31, 1998.

The facilities performing planning for accidental releases are classified into three categories or "programs." Program 3 facilities are subject to the most comprehensive requirements because they pose the greatest hazard potential to workers, the public, and the environment. The proposed Shintech facility would most likely be a Program 3 facility. Of the approximately 200 Program 3 facilities which registered with Louisiana, about half were not listed in the TRI or TEDI databases because they did not meet those program's reporting requirements.

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<sup>15</sup> VOCs/TAPs: Methanol; vinyl chloride; 1,2-Dichloroethane; chloroform; and carbon tetrachloride. TAPs only: Hydrochloric acid; chlorine; and ammonia.

<sup>16</sup> Nitrogen oxides; carbon monoxide; sulfur dioxide; particulate matter; and ozone.

EPA plans to examine a new facility universe including Program 3 facilities under LDEQ's Chemical Accident Prevention Program.

## **V. Point Location and Polygon Boundary Validation**

Performing geographic analyses of these types requires accurate location information, particularly for the center point of the circular areas in which the populations are estimated. While point locations (*i.e.*, the longitude and latitude coordinate for the facility) are included in the TRI reporting form submitted by facilities, experience suggests that some location coordinates submitted may be inaccurate to varying degrees. To minimize inaccuracies, extensive locational data collection to fill the gaps for missing or poor-quality data and verification of point locations of questionable quality and/or selection of a more appropriate point location was performed for as many of the facilities as time permitted. These point location validation efforts could not be performed for all facilities, so facilities were considered a priority which met one or more criteria: (1) they failed a comparison test for location validity; (2) were located in the Industrial Corridor; or (3) reported releases of more than 20,000 pounds of TRI chemicals to air. Only facilities meeting the first criteria were anticipated to be in error, while the others were investigated to improve the overall confidence in the analysis results by reducing a potential source of error.

In addition to developing population estimates based on point locations, EPA has also completed several facility universe analyses using a 1, 2, and 4 mile buffer from the boundaries of TRI facilities (*i.e.*, polygons). Use of a facility polygon provides a more accurate representation of people living near the borders of facilities. Also, large facilities may have several significant, but widely separated emissions points within their boundaries. Region 6 performed polygon location validation efforts described in more detail below.

### **A. TRI Point Location Validation**

To validate point locations for TRI facilities, EPA checked 1995 Toxic Release Inventory site locations with location data for the same facilities which had been previously confirmed by EPA Region 6 GIS management staff; accessed data from EPA's Envirofacts Locational Reference Tables (U.S. EPA 1997), containing locations from other EPA program systems and address match results; and reviewed other EPA and commercial databases. These existing locations were retrieved both to fill any gaps in existing data (*e.g.*, if a facility had reported its location erroneously), and to compare with existing TRI facility locations for confirmation. In addition, the locations were also compared with reported facility street address, city, and parish information.

### **B. TRI Polygon Boundary Validation**

All polygons in the Region 6 GIS were digitized by EPA contractors from maps in EPA or State program files, usually RCRA Part B permits, or from commercial sources (*e.g.*, Louisiana Petrochemical Industry Maps, Homesite, Inc., Baton Rouge, LA.) and georeferenced to either

U.S. Geologic Survey 7.5 minutes quadrangle maps or U.S. Census Bureau TIGER 1992 landmarks (e.g., road intersections or rail road crossings). While, maps may not reflected changes in plant sites since filing of permit application or the source date of commercial maps, they are considered to be satisfactory for proximity analyses using TIGER geography. To validate polygons, a map of the site boundary from the GIS was compared to the original company map to assure that the facility boundary was reasonably represented in the GIS.

### **C. TRI Validation Results**

The results of the TRI location validation are described below:

**All TRI reporters.** EPA confirmed the reliability of approximately 47% of all TRI sites in Louisiana, 71% in the Industrial Corridor Parishes, 72% in the Industrial Corridor 3 Mile Zone, and 100% in St. James Parish. 100% of the polygons for TRI facilities in St. James Parish were validated.

**TRI reporters with SIC codes 2812, 2821, or 2869 (TRI SIC).** EPA confirmed the reliability of approximately 74% of TRI sites with SIC Codes 2812, 2821, or 2869 in Louisiana, 93% in the Industrial Corridor Parishes and in the Industrial Corridor 3 Mile Zone, and 100% in St. James Parish.

**TRI SIC with total air releases greater than 100,000 lbs.** EPA confirmed the reliability of approximately 90% of TRI SIC sites with air emissions greater than 100,000 lbs. in Louisiana and 100% of those in the Industrial Corridor Parishes, in the Industrial Corridor 3 Mile Zone, and in St. James Parish. 100% of the polygons for TRI SIC with total air releases greater than 100,000 lbs. facilities in the Industrial Corridor Parishes and in the Industrial Corridor 3 Mile Zone were validated.

**TRI SIC with total air releases greater than 20,000 lbs.** EPA confirmed the reliability of approximately 93% of TRI SIC sites with air emissions greater than 20,000 lbs. in Louisiana and 100% of those in the Industrial Corridor Parishes, in the Industrial Corridor 3 Mile Zone, and in St. James Parish.

**TRI with total air releases greater than 100,000 lbs.** EPA confirmed the reliability of approximately 78% of TRI sites with air emissions greater than 100,000 lbs. in Louisiana and 100% of those in the Industrial Corridor Parishes, the Industrial Corridor 3 Mile Zone, and in St. James Parish.

**TRI with total air releases greater than 20,000 lbs.** EPA confirmed the reliability of approximately 78% of TRI sites with air emissions greater than 20,000 lbs. in Louisiana and 100% of those in the Industrial Corridor Parishes, the Industrial Corridor 3 Mile Zone, and in St. James Parish.



**TRI reporters with total air releases greater than zero.** EPA confirmed the reliability of approximately 54% of TRI sites with air emissions greater than zero in Louisiana, 83% in the Industrial Corridor 3 Mile Zone, 79% in the Industrial Corridor Parishes, and 100% in St. James Parish.

#### **D. TEDI Point Location Validation**

On January 8, 1998, LDEQ provided EPA a table of 265 facilities that reported to TEDI for the years 1991 through 1996. For this study EPA used 1996, the most recent TEDI reporting year, with 237 sites with emissions in 1996. To obtain point locations, this list was cross-matched with the TRI 1995 facilities (132 matches), with a subset of EPA Aerometric Information Retrieval System (AIRS) emissions sites (37 matches) and the Envirofacts Locational Reference Tables (48 matches). LDEQ provided additional geographic coordinates for sites with no or inadequate (*i.e.*, those located by zip code centroids) point location information. All TEDI sites with point location data were compared to available address or descriptive information to verify locations. EPA method, accuracy, and description (MAD) codes were assigned to indicate a level of certainty in meters. All sites used were in or near the correct Parish. No geographic coordinates were obtained for seven sites and four sites were duplicate sites (*e.g.*, multiple processes on the same plant site). (See Attachment 2). Therefore, demographic characteristics were estimated around a total of 226 of the 237 TEDI facilities.

**TEDI reporters.** EPA confirmed the reliability of 100% of the 226 TEDI reporting facilities available in Louisiana.

**TEDI with reported total air releases greater than 100,000 lbs.** EPA confirmed the reliability of approximately 100% of the 80 TEDI reporting total air releases greater than 100,000 lbs. available in Louisiana.

**TEDI with reported total air releases greater than 20,000 lbs.** EPA confirmed the reliability of approximately 100% of the 140 TEDI facilities reporting total air releases greater than 20,000 lbs. available in Louisiana.

#### **E. Proposed Shintech Facility**

EPA consulted with Shintech staff to determine a point location that approximated the center of the proposed facility. To verify the location, this point was compared to a site map provided by the company. The center of the property was chosen to be comparable to the locational data in the Region 6 database. To develop the polygon for the boundary of the proposed Shintech facility, Region 6 digitized a site map provided by the company. The map was georeferenced to the GIS using landmarks (*e.g.*, road intersections or rail road crossings) from the Census Bureau's TIGER 1992 files. Finally, a map of the site boundary from the GIS was compared to the original company map to assure that the facility boundary was reasonably represented in the GIS.

## VI. Population Estimation Techniques

A geographic information system (GIS) allows extraction and tabulation of data based on spatial proximity to other geographically coded information. In this case, a point location (*i.e.*, a latitude and longitude coordinate) somewhere within the facility boundary was used to draw three circular radii (*i.e.*, 1 mile, 2 miles, 4 miles) to extract and total data from the 1990 Census of Population block-level files. (See Attachments 3 & 4). Similar circular radii are used in other EPA contexts to estimate potentially affected populations (U.S. EPA 1987; U.S. EPA 1989).

EPA used an “area weighted” GIS technique which assumes that populations are evenly distributed throughout a block. For blocks falling entirely within the potentially proximate radius, the entire block’s population is included in the proximate population total. If a radius bisects the block, the estimate of the population inside the proximate area is determined by reference to the fraction of the block’s land area inside the radius. (See Figure 4). Thus, if 40% of a bisected block’s land area falls inside the radius, 40% of the block’s population is included in the proximate population estimate.

The proximate population number represents an estimate of those people who live within the specified distance (*i.e.*, 1 mile, 2 miles, 4 miles) of the point location(s) within the facility. Those living in proximity to a facility are most likely to experience the impacts from facility operations. However, the impacts may differ depending on distance from a facility, EPA looked at the racial makeup of populations estimated to live 1 mile, 2 miles, and 4 miles from selected permitted facilities. The “non-proximate population” number represents the estimate of those people who do not live within the specified distance of the point location of the facility, but reside within the geographic reference area (*e.g.*, state, parish).

The GIS was used to tabulate results for both for individual facilities and for groups of facilities. Some areas were contained within the radii of more than one facility, so specific steps to avoid double counting the population in these areas were taken. Total population estimated to live within a particular radius were calculated for (1) all facilities in a universe combined and (2) for populations near multiple facilities, grouped by the number of proximate facilities (*e.g.*, one facility, 2-3 facilities, 4 or more facilities). (See Figure 5).

The populations tabulations are estimates of the size of the surrounding population, the accuracy of which can be affected by several factors, including the accuracy of the location used as the center point of the retrieval radius; the density and distribution of surrounding populations; and the land area size of the facility. Generally, as the land area and/or population density of the radial areas decreases, the uncertainty increases. As mentioned previously, EPA devoted significant effort to confirming the accuracy of the point location for many facilities. In this analysis, it is likely that the resulting estimates are less accurate for the 1 mile radius than the 2 and 4 mile radii.

## **VII. Geographic Reference Areas**

The Title VI complaint filed concerning the proposed Shintech facility alleges a discriminatory impact on African American residents of St. James Parish. EPA compiled data to test this allegation, but also compiled data for other geographic areas for comparative purposes within the state of Louisiana. EPA believes that to properly evaluate whether the permitting of this facility will present an adverse disparate impact requires a broader frame of reference. Accordingly, the data attached pertain to the State as a whole, Industrial Corridor Parishes, an area defined as the Industrial Corridor 3 Mile Zone, as well as St. James Parish. (See Attachment 5).

### **A. State of Louisiana**

EPA examined the racial demographics of the populations within the three radii for the various facility universes across the State as a whole. (See Figures 2 & 3). The State of Louisiana was examined because LDEQ's permitting jurisdiction is Statewide. The proximate populations include only those people who live within the specified distances (*i.e.*, 1, 2, or 4 miles) of a facility within the State. Accordingly, to understand whether LDEQ's decision to permit the proposed Shintech facility is discriminatory, it is important to have an understanding of how permits and associated impacts are generally distributed under the State's program.

Louisiana is approximately 30.8% African American. Six of Louisiana's 64 parishes (counties) have populations which are more than 50% African American.

### **B. Industrial Corridor**

The Industrial Corridor is generally defined as an area along the Mississippi River between the cities of Baton Rouge and New Orleans. It is not a political jurisdiction within the State; however, it is commonly recognized as a distinct industrial area, such that LDEQ's TRI World Wide Web site displays information specifically on the Industrial Corridor. (LDEQ undated) Various studies in the past have defined the Industrial Corridor slightly differently (*e.g.* as collections of 9, 10, 11 or 12 parishes/counties). (LDEQ, 1991; US EPA, 1993; Institute for Environmental Issues and Policy Assessment, 1996; LDEQ, undated). EPA examined the three radii for the various facility universes in two different areas which can be considered the Industrial Corridor. (See Figures 6 & 7).

#### **1. Industrial Corridor Parishes**

For one compilation of Industrial Corridor data, EPA looked at populations proximate to facilities whose point location fell within the 12 parishes that LDEQ uses in its TRI web site definition of the Mississippi River Industrial Corridor.<sup>17</sup> There is at least one TRI and one TEDI facility in

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<sup>17</sup> East Baton Rouge, West Baton Rouge, Iberville, Ascension, St. James, St. John the Baptist, St. Charles, Jefferson, Orleans, St. Bernard, Plaquemines, and West Feliciana.

each of the 12 Industrial Corridor parishes. These parishes account for about 39% of Louisiana's total population and 47% of its African American population.

## **2. Industrial Corridor 3 Mile Zone**

Recognizing that the Industrial Corridor Parishes compilation is not the only way to examine the Industrial Corridor, EPA also looked at facilities with point locations within 3 miles from either bank of the Mississippi River in the Industrial Corridor Parishes. This 3 mile zone extends roughly from the point where the river leaves West Feliciana Parish to a point south of Venice, near the head of the Passes to the Mississippi River tributary in Plaquemines Parish and includes a portion of the populations in 12 parishes. EPA named this geographic reference area the Industrial Corridor 3 Mile Zone. The three mile zone along the shores of the river was selected based on EPA's understanding that for transportation-related reasons, the majority of industrial development in the Industrial Corridor is concentrated in proximity to the river. There is at least one TRI facility within the 3 mile zone in each of the 12 Industrial Corridor parishes. None of the 226 TEDI facilities in the State are within the 3 mile zone in Orleans parish.

The Industrial Corridor 3 Mile Zone is a densely populated area representing only 3.6% of the State's total land area. About 24% of Louisiana's total population and 34% of its African American population live in the Industrial Corridor 3 Mile Zone.

### **C. St. James Parish**

The 1990 Census showed the total population of St. James Parish as 20,879 with nearly 50% of the Parish population as African American. As discussed above, the Title VI complaint alleges that African Americans in St. James Parish are disproportionately affected by LDEQ's permitting of facilities with toxic emissions. EPA examined this geographic reference area in response to the allegation in the complaint.

The proximate population estimates for St. James Parish include only those people in St. James Parish who live within the specified distances (*i.e.*, 1, 2, or 4 miles) of facilities. For example, CF Industries is a TRI facility in Ascension Parish not far from the border with St. James Parish. However, when the 4-mile radius is drawn from the point location for CF Industries, it takes in a portion of St. James Parish. The 4 mile circle is "clipped" at the border, excluding those people estimated to live within the circle in Ascension Parish from the estimate, so only those people estimated within the portion of circle in St. James Parish are included in the St. James Parish population estimate. (See Figure 8).

There are currently 18 TRI facilities (See Attachment 6) and 12 TEDI facilities that have residents of St. James Parish within their 4 mile radius.

## **1. Currently Operating Facilities**

IMC-Agrico is one of the nation's leading producers, marketers, and distributors of phosphate crop nutrients and animal feed ingredients and has two facilities in St. James Parish--the Uncle Sam plant and the Faustina plant. While both IMC-Agrico facilities report to the SIC major grouping of chemical manufacturers, neither facility reports the same SIC codes as the proposed Shintech facility. Both facilities report to TRI, TEDI and reported under LDEQ's Chemical Accident Prevention Program. The IMC-Agrico Uncle Sam Plant is located in Gonzalez and its primary products are sulfuric and phosphoric acid, which are intermediates in the production of phosphate fertilizers. IMC-Agrico's Faustina plant is located on the western shore of the Mississippi River near the border of Ascension Parish.

St. James Parish is also home to a Chevron Chemical facility which is located on the down river border of the IMC-Agrico Faustina plant. Chevron reports its activities within the SIC major grouping of chemical manufacturers; however, it does not report to the same SIC codes as the proposed Shintech facility. Chevron Chemical reports to both TEDI and TRI and under LDEQ's Chemical Accident Prevention Program. Further down river from Chevron is the St. James Sugar Coop., which is a TRI reporter, but reported no releases of chemicals to the air in 1995.

Across the river from IMC-Agrico Faustina and the Chevron Chemical facility are two other facilities that manufacture chemicals--Air Products & Chemicals, Inc. and Star Enterprise. Air Products classified its business activities under SIC 2813. Star Enterprise converts crude oil into gasolines, aviation jet fuel, furnace oil, No. 6 fuel oil, and liquefied petroleum gas. Star also reports under TEDI and registered to report under LDEQ's Chemical Accident Prevention Program..

The recently built and now operating American/Gulf Coast facility is located approximately two miles north of Convent and is expected to produce 3.31 million tons per year of direct reduced iron. It was granted its preconstruction and operating permit by the LDEQ on March 18, 1996. The American/Gulf Coast facility is classified as a minor source of toxic air pollutants, but it is not expected to report to TRI.

A short distance up river from the IMC-Agrico Faustina plant in Ascension Parish near Donaldsonville are four other facilities--Ampro Fertilizer, CF Industries, Melamine Chemical, and Triad Chemical. All four facilities report to TEDI and TRI, but Ampro is the only one not reporting under LDEQ's Chemical Accident Prevention Program. Ampro and CF Industries classified their business activities under SIC 2873. The Melamine facility produces chemicals used in the manufacture of plastic dinnerware, buttons, and electric outlets. Melamine classified its business activities under SIC 2869, one of the SICs the proposed Shintech facility has listed. Triad classified its business activities under SIC 2873. Across the river in Ascension Parish from the Donaldsonville facilities is the DuPont Burnside plant which reports to both TEDI, TRI, and reported under LDEQ's Chemical Accident Prevention Program. DuPont classified its business activities under SIC 2819.

Clustered in Gramercy, near St. James Parish's border with St. John the Baptist Parish, are three facilities--LaRoche Industries, Kaiser Aluminum & Chemical Corp., and the Colonial Sugar Refinery. The LaRoche Industries facility, which reported under LDEQ's Chemical Accident Prevention Program, is also a chemical manufacturer which classified its business activities under SIC 2812 and SIC 2869--two of the same SICs listed for the proposed Shintech facility. Kaiser classified its business activities under SIC 2819. Kaiser reported under TRI that it did not release any chemicals to the air in 1995. The Colonial Sugar Refinery classified its business activities under SIC 2062.

Another cluster of facilities in St. James Parish is on Highway 3214 near Convent. This cluster includes the IMC-Agrico Uncle Sam plant, the Occidental Chemical Corporation facility, and the American/Gulf Coast DRI Production Facility. Occidental Chemical's products consist of chlorine, sodium hydroxide, hydrogen, and ethylene dichloride. Both the chlorine and hydrogen are consumed internally, but the caustic is distributed by truck, railcar, and barge while EDC moves by barge, and ship. Occidental Chemical reports to TEDI, TRI, and reported under LDEQ's Chemical Accident Prevention Program. Occidental Chemical, like the LaRoche facility is also a chemical manufacturer which classified its business activities under SIC 2812 and SIC 2869--two of the same SICs listed for the proposed Shintech facility. American/Gulf Coast, which is expected to produce 3.31 million tons per year of direct reduced iron (DRI), is not expected to report to TRI.

Three TRI reporters lay entirely within the borders of St. John the Baptist Parish, but have portions of their proximate populations within St. James Parish are Nalco Chemical and Marathon Oil. Nalco classified its business activities primarily under SIC 2869 and secondarily under SIC 2899 and 2819. The Marathon Oil, with two TRI reporting locations in St. John the Baptist Parish, processes both domestic and foreign crude oil into a variety of products, including gasoline, diesel fuel, and No. 6 fuel oil. Marathon and Nalco also reported to TEDI and under LDEQ's Chemical Accident Prevention Program

## **2. Proposed Facilities**

In addition to the proposed Shintech facility, there is one other facility permitted for St. James Parish yet to be built. On May 5, 1997, LDEQ granted Louisiana Iron Works its authorization to construct and operate pursuant to LDEQ's Prevention of Significant Deterioration (PSD) regulations. Louisiana Iron Works will produce approximately 1.66 million tons per year of direct reduced iron. The proposed facility will be located approximately a mile southeast of Lauderdale on the west bank of the Mississippi River. It is not expected to report to TRI.

To refine the analysis of the demographic characteristics of the proximate populations in St. James Parish, EPA conducted analyses using polygons for existing facilities. (See Figures 11 & 12). In addition, EPA performed a demographic analysis using point locations which includes the two iron reduction facilities permitted after 1996, as well as the point location for the proposed Shintech facility to provide an updated picture of St. James Parish. (See Figures 13 & 14). The

results of these polygon and “St. James 1997” point location analyses are displayed in the updated tables.

## **VIII. Demographic Data Compilation Methods**

The areas defined by the various geographic radii have been displayed several ways. Using the GIS, the residential populations near each facility, including racial composition, was estimated at 1, 2, and 4 miles for each facility universe. These data were compiled to examine the:

1. cumulative total population near all facilities included in each universe of facilities;
2. total population living within various distances (*i.e.*, 1, 2 and 4 miles) of more than one facility; and
3. distribution of population composition for each facility.

### **A. Cumulative Total Population Compilation**

Tables A1 through A6 present the cumulative total population for all persons, as well as a breakout of African Americans and non-African Americans, living within 1, 2 and 4 miles of a site for each facility universe. These population estimates were created using the area weighted method previously described. For each facility universe, three layers (for the 1, 2 and 4 mile radii) were created, and then overlaid with the Census block layer to identify blocks entirely and partially in the proximate areas. The population (and proportional population for bisected blocks) was aggregated. A number of the Census blocks were contained in more than one of the proximate areas associated with facilities; these blocks were counted only once in the cumulative total. No “double-counting” of these populations occurred. (See Figure 4).

### **B. Populations Proximate to Multiple Facilities Compilation**

In a similar geographic analysis technique as that used to avoid double-counting, the subtotals of populations living near multiple facilities can be broken down by the number of overlapping facility proximate areas involved. (See Figures 9 & 10). A unique segment area created by overlapping proximate areas is associated with each facility near which it is located, and the total number of associated facilities is recorded for the population in that segment. The population in all the segments with the same number of associated facilities is then added together. EPA used a GIS-based program known as the Population Estimation and Characterization Tool (PECT) to perform these analyses (slightly modified as part of the development of Gateway/Envirofacts). Tables B1 through B7 include these results grouped into three categories (*i.e.*, populations living near 1 facility, near 2-3 facilities, and 4 or more facilities). (U.S. EPA 1994; U.S. EPA 1996).

### **C. Facility Distribution Analyses**

As part of the analysis, the total population and the proportion (percentage) of African Americans living in proximity (*i.e.*, 1, 2, and 4 miles) to each facilities was calculated. The raw percentages

were transformed in presenting the data by dividing them by the State average of African Americans (30.8%) to create a ratio. A ratio value of 1 means that the proportion of African Americans in the proximate population (*e.g.*, 2 mile radii) is the same as the State average. In Tables D1 through D40 simple statistics and bar graphs of these ratios are presented for the various facility universes. These include mean and median values (50<sup>th</sup> percentile), as well as various quantiles, such as the 10<sup>th</sup>, 25<sup>th</sup>, 75<sup>th</sup>, and 90<sup>th</sup> percentiles. There are also counts of the number of facilities that fall into various categories defined using the ratio value, such as 0.50 - 1.00 and over 1.50 times the State average (*i.e.*, 50% lower than to equal to the State average, and 50% greater than the State average, respectively). The associated bar graphs show the number and percent of facilities on the vertical axis and the ranges of ratio values on the horizontal axis.

These proportions do not reflect the total number of people involved, but simply the fraction. For example, the proximate population near a facility with 35% African Americans could be either 100 people or 10,000 people. These proportions also count the populations in the proximate areas as part of more than one facility's total. The total population figures presented in Tables A1 through B7 cannot be derived by adding together the proximate populations for the individual facilities because this approach would include significant double-counting.

## IX. Comparisons and Statistical Tests

The main comparisons performed involved examining the racial composition of the proximate population. First, EPA determined what percent of the total African American population in the reference area (*e.g.*, percent of the State's total African American population) is proximate (*i.e.*, within the radii). Then, EPA determined what percent of the total non-African American population in the reference area is proximate. These two numbers (conditional probabilities) are then compared to determine the Relative-Ratio which can be used as an indicator of association between race and proximity. In addition, for universes in which the relative ratio is greater than one, the expected number of African-Americans in the proximate population was computed based on the average composition of the reference area, as well as the number of persons in excess of this value, named the "exceedance."

### A. Relative Ratio

In the attached tables, EPA has also used the term relative-ratio ( $p1 \div p2$ ), which is the ratio of probabilities of African-Americans being proximate to facilities to that of non-African-Americans. The relative-ratio could also be used as a measure of association between race and proximity where a value of 1.0 ( $p1 = p2$ ) indicates no relationship between race and proximity. In the Statewide example the relative-ratio is:

$$\frac{10.1\%}{5.8\%} = 1.73$$



This result indicates that the probability of an African-American in the State being within 2 miles of a TRI facility with SIC codes 2869, 2821, and/or 2812 is 73% higher than that of a non-African-American. Results of these analyses are presented in Tables A1 through B7.

## **B. Expected Values and Exceedances**

A relative ratio greater than 1 indicates that the probability of a resident African-American being in the proximate population is higher than that of non-African-Americans. For facility universes with a relative ratio greater than 1, there are more African-Americans in the proximate population than would be expected ("expected value") based on the average composition of the reference area. The estimated number of African American persons in the proximate area, minus this expected value, was used to determine the "exceedance" or the number of additional African-American persons in the proximate area above the expected value. The results of these analyses are presented in Tables A1 through B7.

## **C. Statistical Test for Homogeneity**

The tests performed show whether the observed racial distribution of proximate populations can be explained by chance alone. If the observed racial distribution cannot be explained by chance alone, then this serves as an indication that there is a statistically significant difference with respect to race in the proximate areas. While certainly relevant to a adverse disparate impact determination, statistical significance may not be determinative of a adverse disparate impact for purposes of Title VI.

The tests were performed for each facility universe at each radii (*i.e.*, 1, 2, and 4 miles) in the four geographic reference areas (*i.e.*, Statewide, the Industrial Corridor 3 Mile Zone, the Industrial Corridor Parishes, and St. James Parish). A 2x2 table was constructed for each facility universe at 1, 2, and 4 miles. A test for homogeneity (Kendall, et al. 1978) with regard to racial distribution (*i.e.*, racial distribution of the proximate population is consistent with the reference population) was performed for each comparison studied.<sup>18</sup>

For example, for the TRI facilities with SIC codes 2869, 2821, and/or 2812 in the State, EPA tested whether the conditional probability of being proximate given that the person is African American in the State ( $p_1=0.101$ ) is equal to the conditional probability of being proximate as a non-African American ( $p_2=0.058$ ). "Proximate" in this example means living within 2 miles of a facility. EPA tested the hypothesis  $p_1 = p_2$  against  $p_1 \neq p_2$ , which is a two-sided test for homogeneity with respect to race.

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<sup>18</sup> Although not displayed in the attached tables, Fisher's Exact test for association between race and proximity was performed. The test results were consistent with the test results shown for homogeneity.

EPA first constructed the State/TRI SIC/2 miles 2x2 table:

	African American	Non-African American
Proximate	131,507	170,461
Not Proximate	1,167,774	2,750,231

Under the null hypothesis  $p_1 = p_2$ , the expected value of the difference is zero. The above test shows that the difference of the proportions differs from the expected value, zero, by 0.043 ( $p_1 - p_2$ ). The measure of predicted fluctuations from the expected value is the standard deviation. In this case, the difference of the proportions (0.043) differs from the expected value by 157.65 standard deviations. As a general rule, for such large samples, if the difference between the expected value and observed number is greater than two or three standard deviations, then it is unlikely that the outcome results from chance alone.

The total population of Louisiana is used to calculate  $p_1$  and  $p_2$  for the statewide standard deviations. Similarly, the total population of St. James Parish is used to calculate  $p_1$  and  $p_2$  for the St. James Parish standard deviations. For both the Industrial Corridor Parishes 3 Mile Zone and the Industrial Corridor Parishes, the total population for the parishes of East Baton Rouge, West Baton Rouge, Iberville, Ascension, St. James, St. John the Baptist, St. Charles, Jefferson, Orleans, St. Bernard, Plaquemines, and West Feliciana is used to calculate  $p_1$  and  $p_2$  for the standard deviations.

## **X. Toxic Chemical Data Compilation**

In addition to the demographic analyses described above, EPA has used several techniques to compare the potential exposures to toxic air emissions in African American and non-African American populations. Multiple approaches were used because there is currently no broad consensus on techniques for defining potential impacts of a broad range of toxic air emissions in different population subgroups.

For example, some studies have used proximity to the number of TRI facilities as a basis for comparison (*e.g.* Burke, 1993). However, this approach does not reflect the fact that air releases from TRI sites vary widely -- from zero to millions of pounds. Other studies have used aggregate pounds of TRI data to compare states and counties (U.S. EPA, 1997a), a method that has also been used in some environmental justice analyses (Perlin, 1995). While such approaches are frequently used and may be informative, aggregates of raw TRI emissions combine hundreds of chemicals of widely varying toxicity. These different toxicities can affect comparisons based on emissions, in some cases, to the same degree as variations in reported emissions volumes.

To account for some of these gaps in existing methodologies, EPA has developed the Relative Emissions Burden Analysis for this investigation. Recognizing that a pound of emissions of a highly toxic chemical does not result in the same impact as a pound of emissions of a less toxic

chemical, EPA “normalized” the chemicals by placing them on the same relative toxicity scale. This was done by adjusting downward the pounds of chemicals that are less chronically toxic to humans. Since normalization results in pounds of chemicals with approximately equivalent toxicity potential, the different chemicals in the TRI emissions analyses may be reasonably added together and treated as one “normalized chemical.” Adding these normalized pounds together can also account for the exposures from multiple facilities to proximate populations. When these data are combined with demographic information across proximate census blocks by population subgroup, the pattern of how these emissions burden is distributed from one group relative to another can also be calculated.

The Relative Emissions Burden Analysis is described in more detail below. EPA is continuing to refine this methodology. Although airborne emissions are not the only possible burden upon the surrounding communities, they represent, on a normalized basis, many times more pounds than the corresponding water or land releases and are more widely available to the general population.

## **A. TRI Emissions Information**

### **1. Louisiana**

In 1995, Louisiana ranked 2<sup>nd</sup> in the United States in total releases of TRI chemicals with 172.3 million pounds released to air, water, and land combined. Louisiana’s total air releases in 1995 were 84.8 million pounds, ranking 4<sup>th</sup> in the United States. Five of Louisiana’s Parishes rank in the top 20 counties nationally for total TRI air releases.

### **2. Industrial Corridor Parishes**

Approximately, 45% of the TRI reporting facilities in Louisiana are located in the Industrial Corridor Parishes which contribute 53% of the total TRI air releases in the State. Five out of 12 Parishes in the Industrial Corridor rank in the top 10 for total TRI air releases for the state of Louisiana. East Baton Rouge, Ascension, and St. James were 3 of the 5 Louisiana Parishes to rank in the top 20 counties nationally for air releases.

### **3. Industrial Corridor 3 Mile Zone**

Approximately, 40% of the TRI reporting facilities in Louisiana are located in the “Industrial Corridor 3 Mile Zone.” The facilities located within this zone contribute 53% of the total TRI air releases in the State.

### **4. St. James Parish**

The facilities which report to TRI that their location is in St. James Parish reported 14.7 million pounds of TRI releases in 1995, including 6.5 million pounds of ammonia to the air from a single facility and 6.2 million pounds of phosphoric acid to water from two facilities. Facilities in St. James Parish reported 7.5 million pounds of air releases, or about 8.9% of the State total. St.

James Parish ranked 4th in the State for total TRI air releases and 2nd in the State for total TRI air/land/water releases in 1995. The projected TRI total air releases from the Shintech facility are about 192,200 pounds, which would increase the 1995 total air releases for facilities in St. James Parish by 2.6%.

As discussed earlier, facilities with their point location located in adjacent parishes whose four mile proximate areas impinge on St. James Parish reported an additional 9.1 million pounds of air releases, or about 10.8% of the state's total. Thus, the 18 facilities in or near St. James parish reported a total of over 16.6 million pounds of air releases in 1995. (Attachment 6). This represents 19.6% of the Statewide reported air releases. There are 12 TRI facilities whose 4-mile radius overlaps with the proposed Shintech facility's 4 mile radius (Figure 15). This represents 16,163,343 pounds of TRI air emissions or 19.06% of the State total TRI air emissions.

## **B. Relative Emissions Burden Analysis**

As previously mentioned, in this investigation EPA examined the relative distribution of TRI emissions to African Americans and non-African Americans. EPA does not believe that an exact distribution of TRI emissions to each member of the population must be determined as part of the Title VI analysis, but that the analysis should determine the *relative* distribution to the two racial groups.

Since the chemicals being emitted from facilities differ widely in their ability to cause harm, EPA normalized all reported TRI chemical emissions for their toxicity, using the EPA Office of Pollution Prevention and Toxics' (OPPT) Risk Screening Environmental Indicator weights (EPA 1997c, as amended by EPA 1998b). As a result of comments from a 1997 review by EPA's Science Advisory Board, OPPT developed the current (March, 1998) weighting methodology to more directly reflect toxicity values on a continuum, rather than using an order-of-magnitude "bin" system as was used in the 1997 document.

Each chemical is assigned a weight based on its relative toxicity, from less than one to 1,000,000. The pounds of each individual chemical were multiplied by the toxicity weight, then that product was divided by a 100,000 normalization factor. So, 100 pounds of a chemical with a weight of 100,000 would thereby remain at 100 pounds, but pounds of chemicals of lesser toxicity would be adjusted proportionately by this method (*e.g.* a weighting factor of 10,000, or one tenth of the 100,000 value, would adjust 100 pounds to 10 pounds). The normalization allows all the chemicals from a facility to be added together to arrive at a number of "adjusted pounds of air release" for each facility.

To estimate how these pounds of releases are distributed to African Americans and non-African Americans, EPA employed a simple screening methodology referred to as the "Relative Emissions Burden Analysis." The "adjusted pounds of air release" value was distributed within the 2-mile and 4-mile radii proximate areas by dividing the adjusted pounds by the area of the circle to obtain "adjusted pounds of air release per square mile" ("lbs./sq. mi"). This simple methodology, therefore, uses the assumption that the burden is spread equally within the 2- or 4-mile circles for

each facility. It does not make adjustments for wind direction and speed, nor for dispersion over distance from the facility (this is to be done in the “enhanced” analysis discussed below).

The radii of the circles can be varied for any particular analysis. For this analysis, EPA chose 2 miles as the closest distance to the facilities for which the population data is believed to be reasonably accurate (due to limitations in placing sources exactly for all 314 facilities, and because population was summarized by census block). Four miles was chosen as a good representation of the distance beyond which the air plume dispersion would render most emissions concentrations small relative to within the 4-mile zone. Some emissions may reach beyond 4 miles (typically, air models will be run to a 50 kilometer, or about 30 mile, distance but the concentrations at that point can be quite small).

The absolute value of the “lbs./sq. mi” number is not interpretable (because it varies by the size of the circle drawn) but the ratio of two values using the same size circles as a basis *are* interpretable. Since the “lbs./sq. mi.” numbers are all based on normalized chemicals, they are also additive. That is, if two different facilities distribute emissions to persons in one census block, one facility with a value of 10 and the other with a value of 25, the persons in the census block would have a total emissions burden value of 35 lbs/sq mi. Each person within the census block would be assigned that value (that is, the average lbs/sq mi for that census block would be 35 for everyone in the block, both African-Americans and non-African Americans). By aggregating total burden *across* all the census blocks of various lbs/sq mi values, and considering the population density in each, a profile of the emissions burden of African Americans and non-African Americans across the study area can be compiled and compared.

The various facilities and the census blocks completely or partly within the 2- and 4-mile radii circles were analyzed in the above manner. African American and non-African American individuals within each block were assigned the total lbs/sq mi score for all the facilities that influenced their block. The total population of each group within the census block was multiplied by the lbs/sq mi score to arrive at a “person-pounds per square mile” (PPSM) indicator for that block.

All PPSM totals were added, then divided by the total number of persons (either African American or non-African American, as appropriate) in the 2-mile and 4-mile radii study areas to arrive at an *average* lbs/sq mi number for each racial group in the study area. Again, the absolute values of these numbers are not interpretable but the ratio is the comparison of the amount of emissions in one group versus the other. For example, if in a 2-mile radius for the study area of a facility universe the average lbs/sq mi number for African Americans is 35 and for non-African Americans 20, the African American to non-African American ratio would be 35/20 or 1.75. This ratio would indicate that African Americans experience a 75% greater burden of TRI air emissions than non-African Americans. In this example, “burden” means that chemical emissions, after normalization for toxicity differences, are present to some extent in the air of the study area and are possibly available for persons to be exposed. This analysis does not presume exposure will occur for every person in the area, but it looks at the patterns of “availability” within the two study groups. The analysis also focuses exclusively on the population within the proximate areas near facilities, rather

than comparing populations in the proximate area to the general state population, as in earlier analyses.

### **C. Enhanced Relative Emissions Burden Analysis**

The above methodology yields valuable insight into the way TRI emissions are distributed within a community. However, EPA believes that it might be further refined by incorporating the influence of wind direction and wind speed, since the above method of distributing the burdens (in lbs./sq mi equally around all parts of the 2 and 4-mile radius circles being studied) within the study areas assumes no influence of wind directions or speed on the distribution of impact. EPA is currently exploring the use of simple air models to distribute impact in a more realistic manner.

Both the basic Relative Emissions Burden Analysis and the Enhanced Relative Emissions Burden Analysis use information that is generally in the public domain and readily available. EPA intends to make the software to do this type of enhanced relative impact analysis available to the public in the summer of 1998.

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## **Appendices**

Appendix 1. Cumulative Total Population -- Statewide (Including Shintech)

Appendix 2. Cumulative Total Population -- St. James Parish (Including Shintech)

## **Data Files**

File 1. Cover Sheet - Structure of Spreadsheet of TRI Facilities

File 2. Electronic Spreadsheet of TRI Facilities

File 3. Cover Sheet - Structure of Spreadsheet of TRI Facilities

File 4. Electronic Spreadsheet of TEDI Facilities

## Attachment 1

TRI Facility Counts (excluding Shintech) <sup>1</sup>					
Facility Universe	Statewide	Parishes	3 Mile Zone	St. James Parish	
				Inside <sup>2</sup>	Contributing <sup>3</sup>
<b>All TRI</b>					
Facilities	314	141	127	10	8
Air Releases (lb)	84,841,485	45,233,434	44,719,609	7,520,700	9,134,295
% of Total Air Releases	100.0%	53.3%	52.7%	8.9%	10.8%
<b>TRI SIC</b>					
Facilities	68	43	43	2	2
Air Releases (lb)	24,225,705 lbs.	19,268,025	19,268,025	327,434	551,144
% of Total Air Releases	28.6%	22.7%	22.7%	0.4%	0.6%
<b>TRI SIC Releases Greater than 100,000 lbs.</b>					
Facilities	31	23	23	1	1
Air Releases (lb)	23,442,387	18,920,491	18,920,491	312,972	542,476
% of Total Air Releases	27.6%	22.3%	22.3%	0.4%	0.6%

<sup>1</sup> There were 64 TRI facilities in the state in 1995 releasing more emissions to air than Shintech's estimated 192,234 lbs. and 38 in the Corridor Parishes. Their total air releases in 1995 were are 79,873,354 accounting for 94.1% of the total TRI releases to air.

<sup>2</sup> Facilities reported as being in St James Parish, even if the facility area may cross parish boundaries, and/or if the facility centroid may be outside the parish. For the purposes of this analysis, Star Enterprises is considered to be inside St. James Parish.

<sup>3</sup> Facilities whose 4 mile radius proximate area impinges on St James Parish.



TRI Facility Counts (excluding Shintech) (cont'd)					
Facility Universe	Statewide	Parishes	3 Mile Zone	St. James Parish	
				Inside	Contributing
<b>TRI SIC Releases Greater than 20,000 lbs.</b>					
Facilities	40	29	29	1	1
Air Releases (lb)	23,869,319	19,142,201	19,142,201	312,972	542,476
% of Total Air Releases	28.1%	22.6%	22.6%	0.4%	0.6%
<b>TRI Releases Greater than 100,000 lbs. to Air</b>					
Facilities	81	48	47	5	5
Air Releases (lb)	82,242,913	48,830,976	43,619,676	7,505,560	9,071,878
% of Total Air Releases	96.9%	51.7%	51.4%	8.8%	10.7%
<b>TRI Releases Greater than 20,000 lbs. to Air</b>					
Facilities	125	72	66	5	6
Air Releases (lb)	84,265,009	45,000,382	44,498,835	7,505,560	9,124,892
% of Total Air Releases	99.3%	53.0%	52.4%	8.8%	10.8%
<b>TRI Releases Greater than 0 lbs to Air</b>					
Facilities	246	116	104	9	8
Air Releases (lb)	84,841,465	45,233,424	44,719,609	7,520,700	9,134,295
% of Total Air Releases	100.0%	53.3%	52.7%	8.9%	10.8%

## Attachment 2

### Louisiana Toxic Emissions Data Inventory (TEDI) Sites without Locations

#### FACILITIES WITH INACCURATE LOCATIONS

<b>TEDI-ID</b>	<b>NAME</b>	<b>ADDRESS</b>	<b>CITY</b>
13400143	T.T.BARGE CLEANING, METAIRIE	@POWERLINE/RIVER RD	HARAHAN
22400048	CHEVRON PIPELINE, EMPIRE		
26000019	TRANSCONTINENTAL GAS PIPE LINE	STAT#54/2.5M E HY49	
26600098	LA L & E/E LAKE SAND	5 MILES OFFSHORE	FRANKLIN
26600055	TRUNKLINE/PATTERSON	CS/HWY 190 WEST OF	PATTERSON
29400103	AMERADA/LELEUX CF	1 MILE NORTH OF	KAPLAN

#### DUPLICATE FACILITIES

<b>TEDI-ID</b>	<b>NAME</b>
05200012	CONDEA VISTA VCM
05200049	CONDEA VISTA LAB
08400106	RHONE POULENC
30600021	GAYLORD BOX PLANT

### Attachment 3

Estimated Population Near Proposed Shintech Facility		
	Total	Percent
<b>1 mile</b>	87	
African American population	70	80.50%
Non-African American population	17	19.50%
<b>2 miles</b>	1,028	
African American population	824	80.20%
Non-African American population	204	19.80%
<b>4 miles</b>	3,165	
African American population	2,650	83.70%
Non-African American population	515	16.30%

## Attachment 4

Shintech's Estimated Contribution to Demographics <sup>1</sup>			
Facility Universe	1 mile	2 miles	4 miles
<b>All TRI</b> Total	87	239	0
African American	70	216	0
Non-African American	17	23	0
<b>TRI SIC</b> Total	87	862	110
African American	70	692	103
Non-African American	17	170	7
<b>TRI SIC Releases Greater than 100,000 lbs.</b> Total	87	1028	2314
African American	70	824	2031
Non-African American	17	204	283
<b>TRI SIC Releases Greater than 20,000 lbs.</b> Total	87	1028	2314
African American	70	824	2031
Non-African American	17	204	283
<b>TRI Releases Greater than 100,000 lbs.</b> Total	87	416	43
African American	70	359	41
Non-African American	17	57	2
<b>TRI Releases Greater than 20,000 lbs.</b> Total	87	416	43
African American	70	359	41
Non-African American	17	57	2
<b>TRI Releases Greater than 0 lbs</b> Total	87	239	6
African American	70	216	6
Non-African American	17	23	0

---

<sup>1</sup> Numbers represent people not already living within 1, 2, or 4 miles of a facility.

## Attachment 5

GENERAL POPULATION STATISTICS		
POPULATIONS	TOTAL	PERCENT
<b>Louisiana</b>	4,219,973	
African American	1,299,281	30.8%
Non-African American	2,920,692	69.2%
<b>Industrial Corridor Parishes Population</b>	1,642,464	
African American	604,977	36.8%
Non-African American	1,037,487	63.2%
<b>St. James Parish</b>	20,879	
African American	10,357	49.60%
Non-African American	10,522	50.40%

## Attachment 6

Permitted TRI Releases for Facilities with 4 mile Proximate Populations in St. James Parish		
Facilities	(4 mile radii)	Total TRI Releases to Air
Proposed Shintech	(St. James)	estimated 192,000 lbs.
Proposed Louisiana Iron Works	(St. James)	?
American/Gulf Coast Iron Reduction	(St. James)	?
IMC-Agrico Faustina	(St. James)	6,659,245 lbs.
CF Industries	(Ascension)	4,958,095 lbs.
Triad Chemical	(Ascension)	3,298,182 lbs.
Melamine Chemical	(Ascension)	542,476 lbs.
LaRoche Industries	(St. James & St. John the Baptist)	312,972 lbs.
IMC-Agrico Uncle Sam	(St. James)	220,725 lbs.
Star Enterprises	(St. James & Ascension)	192,933 lbs.
Marathon Oil (2 TRI reporters)	(St. John the Baptist)	164,027 lbs. 735 lbs.
Chevron Chemical	(St. James)	119,685 lbs.
Ampro	(Ascension)	109,098 lbs.
DuPont (Burnside) Plant	(Ascension)	53,014 lbs.
Occidental Chemical	(St. James)	14,462 lbs.
Nalco Chemical	(St. John the Baptist)	8,668 lbs.
Air Products & Chemicals	(St. James & Ascension)	428 lbs.
Colonial Sugar	(St. James)	250 lbs.
St. James Sugar Coop.	(St. James)	0 lbs.
Kaiser Aluminum & Chemical Corp.	(St. James & St. John the Baptist)	0 lbs.

# FIGURES

FIGURE 1



**Figure 1. Map of St. James Parish, LA**

(Electronic version found in Figure1.pdf.)

FIGURE 2

**Figure 2. Map of Toxic Release Inventory (TRI) Sites with Releases Reported in 1995**

(Electronic version found in Figure2.pdf.)

FIGURE

**Figure 3. Map of Toxic Emission Data Inventory (TEDI) Sites  
with Releases Reported in 1996**

(Electronic version found in Figure3.pdf.)

FIGURE 4

**Figure 4. Map of Example of 1 Mile Zone Showing Census Blocks**

(Electronic version found in Figure 4.pdf.)

**Figure 4 (Cont'd) Census Block Information**

<b>Census Block</b>	<b>Land Area in Zone</b>	<b>Total Population</b>	<b>Population in Zone</b>
<b>128</b>	25%	48	12
<b>133</b>	5%	0	0
<b>143</b>	2%	0	0
<b>144</b>	94%	0	0
<b>145</b>	61%	0	0
<b>146</b>	100%	5	5
<b>147</b>	84%	11	9
<b>148</b>	15%	77	12
<b>204</b>	6%	0	0
<b>205</b>	85%	5	4
<b>206</b>	100%	11	11
<b>207</b>	96%	20	19
<b>208</b>	37%	36	13
<b>231</b>	29%	0	0
<b>232</b>	100%	1	1
<b>234</b>	6%	17	1
<b>Total</b>		231	87



FIGURE

**Figure 5. Illustration of Overlapping Radii for Populations near Multiple Facilities**

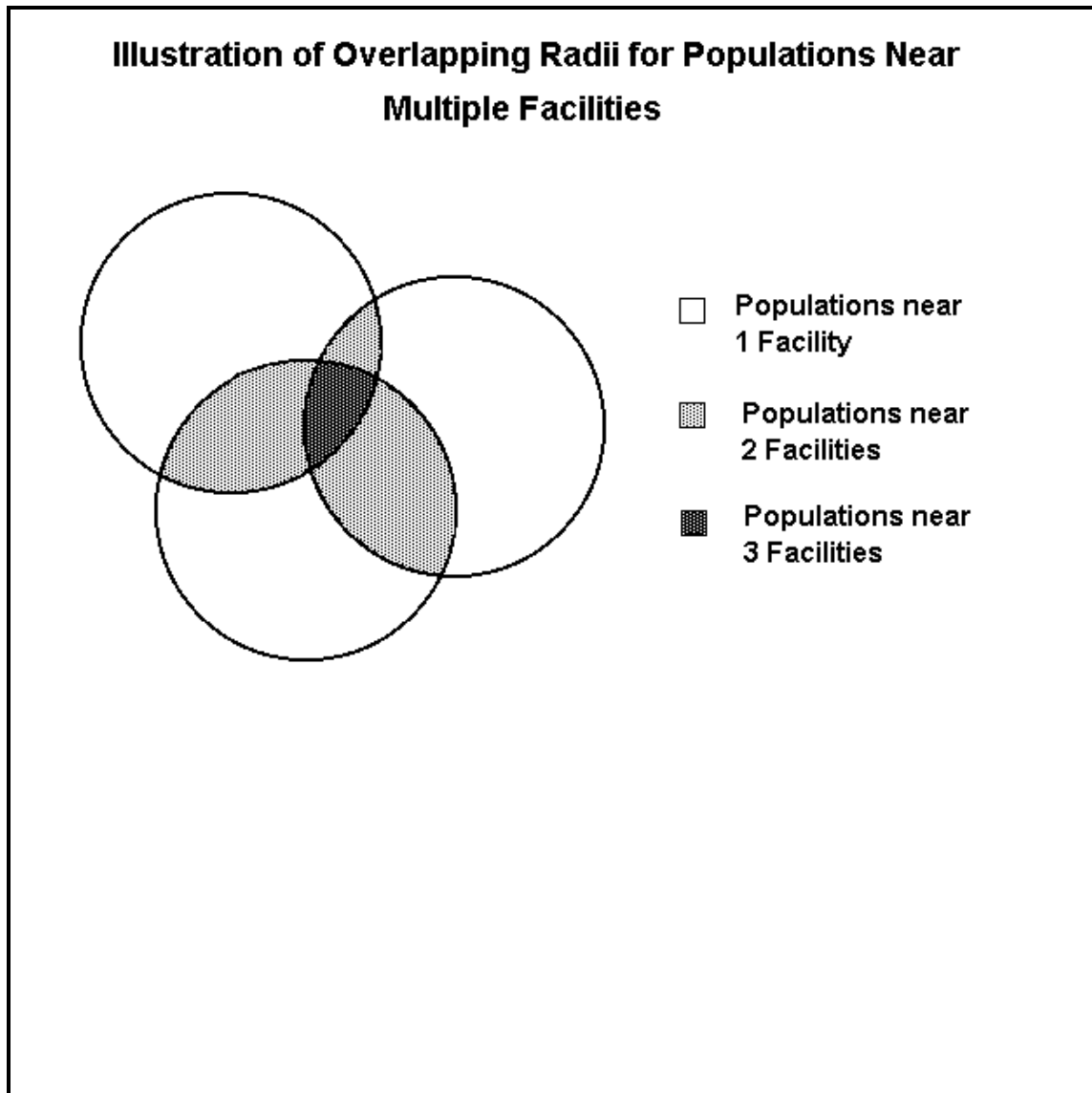


FIGURE 6

**Figure 6. Map of Mississippi River Industrial Corridor TRI  
with SIC 2812, 2821, &/or 2869**

(Electronic version found in Figure 6.pdf.)

FIGURE

**Figure 7. Map of Mississippi River Industrial Corridor TRI and TEDI Sites with Air Releases Greater than 100,000 Pounds**

(Electronic version found in Figure 7.pdf.)

FIGURE 8

**Figure 8. Map of St. James Parish Population Estimates**

(Electronic version found in Figure 8.pdf.)



FIGURE 9

**Figure 9. Map of St. James Parish Population Density -- 2 Mile Zone Around Fenceline**

(Electronic version found in Figure 9.pdf.)

FIGURE 10

**Figure 10. Map of St. James Parish Percent African-American -- 2 Mile Zone Around  
Fenceline**

(Electronic version found in Figure 10.pdf.)

FIGURE 11

**Figure 11. Map of St. James Parish Population Density**

(Electronic version found in Figure 11.pdf.)

FIGURE 12

**Figure 12. Map of St. James Parish Percent African-American**

(Electronic version found in Figure 12.pdf.)



FIGURE 1

**Figure 13. Map of St. James Parish –1998 Population Density**

(Electronic version found in Figure 13.pdf.)

FIGURE 14

**Figure 14. Map of St. James Parish –1998 Percent African American**

(Electronic version found in Figure 14.pdf.)

FIGURE 1

**Figure 15. Map of Shintech TRI/TEDI Facility Four Mile Zone**

(Electronic version found in Figure 15.pdf.)

TA LES

# DISTRIBUTION CHARTS



## **TRI Facility Distribution Charts**

The percentage of the African American population in the three proximate areas near each site was normalized by computing a ratio based on the State average of 30.8% African Americans. If a facility's proximate population proportion for African Americans equals the State average, the ratio would be equal to 1. Various simple statistics (e.g., mean, median, 90th percentile) were calculated and displayed in a table. The number of facilities were counted in categories based on the ratio and the results displayed in a second table and in a histogram (bar graph).

For example, those facilities in the 1.25 -1.50 range had proportions of African-Americans between 25% and 50% higher than (or between 1.25 and 1.5 times) the State average, while facilities in the range of 0.25 -0.50 had proportions between 50% and 75% lower (or 0.5 to 0.25 times) than the state average. These category counts are presented in the accompanying bar graph. Facilities with a total population size estimate of zero were excluded and the number of included facilities was noted. Facilities with zero African-American populations were presented as a separate category.

Using this approach, the proportion of African-Americans within 2 miles of the proposed Shintech facility is 80.2%, or 2.6 times the State average. This would place the facility above the 90th percentile for all TRI facilities Statewide and between the 75th and 90th percentiles for facilities releasing more than 100,000 pounds to air.

The bar graphs allow comparison of the number and percent of facilities with proportions of African-Americans falling above and below the state average, and those much above or much below the average. While the associated data table includes the percent of the facilities which fall into each category, the bar graph includes axes showing both the percentage of facilities (on the left) and the number of facilities (on the right).

# APPENDICES

# Appendix 1

Cumulative Total Population -- Statewide (Including Shintech)						1 of 2
Facility Universe		Estimated Number of African Americans in Proximity % of African American Population in Geographic Area in Proximity (p1)	Number of Standard Deviations	Estimated Number of Non- African Americans in Proximity % of Non-African American Population in Geographic Area in Proximity (p2)	Ratio of % African American In Proximity to % of Non-African American In Proximity $\frac{(p1)}{(p2)}$	
<b>All TRI (315)</b>						
1 mile	Total	537,371	214,849	156.27	322,522	
	Percent		16.5%		11.0%	1.50
2 miles	Total	1,540,617	593,164	260.27	947,453	
	Percent		45.7%		32.4%	1.41
4 miles	Total	2,837,630	986,222	252.89	1,851,408	
	Percent		75.9%		63.4%	1.20
<b>TRI SICs (69)</b>						
1 mile	Total	66,988	26,417	48.87	40,571	
	Percent		2.0%		1.4%	1.46
2 miles	Total	302,830	132,199	159.19	170,631	
	Percent		10.2%		5.8%	1.74
4 miles	Total	1,014,385	401,832	220.90	612,553	
	Percent		30.9%		21.0%	1.47
<b>TRI Releases Greater than 100,000 lbs To Air<sup>1</sup> (82)</b>						
1 mile	Total	103,172	37,026		66,066	
2 miles	Total	396,195	156,228		239,824	
4 miles	Total	1,208,348	476,329		729,846	

<sup>1</sup> Estimates in January 30, 1998 Table A1 included a typographical error. Population estimates have been corrected, but statistical analyses have not been recalculated.

**Bolded numbers** in the third column indicate that the two percentages (p1 and p2) are statistically different (see Standard Deviation). This is shown only for the cases when p1>p2.

Cumulative Total Population -- Statewide (Including Shintech) (Cont'd)					2 of 2
Facility Universe	Estimated Total Proximate Population	Estimated Number of African Americans in Proximity % of African American Population in Geographic Area in Proximity (p1)	Number of Standard Deviations	Estimated Number of Non- African Americans in Proximity % of Non-African American Population in Geographic Area in Proximity (p2)	Ratio of % African American In Proximity to % of Non-African American In Proximity $\frac{(p1)}{(p2)}$
<b>TRI Releases Greater than 20,000 lbs. To Air (126)</b>					
1 mile Total	160,275	<b>59,000</b> 4.5%	53.26	101,275 3.5%	1.31
2 miles Total	592,060	<b>249,613</b> 19.2%	204.42	342,447 11.7%	1.64
4 miles Total	1,555,753	<b>628,535</b> 48.4%	326.86	927,218 31.7%	1.52
<b>TRI Releases Greater than 0 lbs. To Air (247)</b>					
1 mile Total	327,604	<b>116,337</b> 9.0%	60.97	211,267 7.2%	1.24
2 miles Total	1,044,715	<b>381,386</b> 29.4%	146.00	663,329 22.7%	1.29
4 miles Total	2,396,941	<b>808,059</b> 62.2%	149.17	1,588,882 54.4%	1.14

**Bolded numbers** in the third column indicate that the two percentages (p1 and p2) are statistically different (see Standard Deviation). This is shown only for the cases when p1>p2.

## Appendix 2

Cumulative Total Population -- St. James Parish (Including Shintech)						1 of 2
Facility Universe	Estimated Total Proximate Population	Estimated Number of African Americans in Proximity  % of African American Population in Geographic Area in Proximity (p1)	Number of Standard Deviations	Estimated Number of Non- African Americans in Proximity  % of Non-African American Population in Geographic Area in Proximity (p2)	Ratio of % African American In Proximity to % of Non-African American In Proximity  $\frac{(p1)}{(p2)}$	
<b>All TRI (10)</b>						
1 mile Total	4,088	1,000	35.85	3,088		
Percent		9.7%		29.3%	0.33	
2 miles Total	9,844	4,780	2.86	5,064		
Percent		46.2%		48.1%	0.96	
4 miles Total	16,433	<b>8,793</b>	21.69	7,640		
Percent		84.9%		72.6%	1.17	
<b>TRI SICs (3)</b>						
1 mile Total	108	<b>71</b>	3.36	37		
Percent		0.7%		0.4%	1.95	
2 miles Total	3,797	1,684	7.16	2,113		
Percent		16.3%		20.1%	0.81	
4 miles Total	11,394	<b>5,843</b>	5.31	5,551		
Percent		56.4%		52.8%	1.07	
<b>TRI Releases Greater than 100,000 lbs. To Air(5)</b>						
1 mile Total	297	<b>207</b>	6.98	90		
Percent		2.0%		0.9%	2.34	
2 miles Total	4,598	2,275	0.19	2,323		
Percent		22.0%		22.1%	0.99	
4 miles Total	12,953	<b>6,534</b>	3.10	6,419		
Percent		63.1%		61.0%	1.03	

**Bolded numbers** in the third column indicate that the two percentages (p1 and p2) are statistically different (see Standard Deviation). This is shown only for the cases when p1>p2.

Cumulative Total Population -- St. James Parish (Including Shintech)(Cont'd)					2 of 2
Facility Universe	Estimated Total Proximate Population	Estimated Number of African Americans in Proximity  % of African American Population in Geographic Area in Proximity (p1)	Number of Standard Deviations	Estimated Number of Non- African Americans in Proximity  % of Non-African American Population in Geographic Area in Proximity (p2)	Ratio of % African American In Proximity to % of Non-African American in Proximity  $\frac{(p1)}{(p2)}$
<b>TRI Releases Greater than 20,000 lbs. To Air (5)</b>					
1 mile Total	325	<b>207</b>	5.12	118	
Percent		2.0%		1.1%	1.78
2 miles Total	4,598	2,275	0.19	2323	
Percent		22.0%		22.1%	0.99
4 miles Total	12,953	<b>6,534</b>	3.10	6,419	
Percent		63.1%		61.0%	1.03
<b>TRI Releases Greater than 0 lbs. To Air (8)</b>					
1 mile Total	3,954	939	36.12	3,015	
Percent		9.1%		28.7%	0.32
2 miles Total	9,218	4,421	4.23	4,797	
Percent		42.7%		45.6%	0.94
4 miles Total	15,684	<b>8,156</b>	12.04	7,528	
Percent		78.7%		71.5%	1.10

**Bolded numbers** in the third column indicate that the two percentages (p1 and p2) are statistically different (see Standard Deviation). This is shown only for the cases when p1>p2.

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